# FROM AUGUST SCHLEICHER TO SERGEI STAROSTIN
On the development of the tree-diagram models of the Indo-European languages

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The purpose of the present study is to confront most representative models of the internal classification of Indo-European languages and their daughter branches.
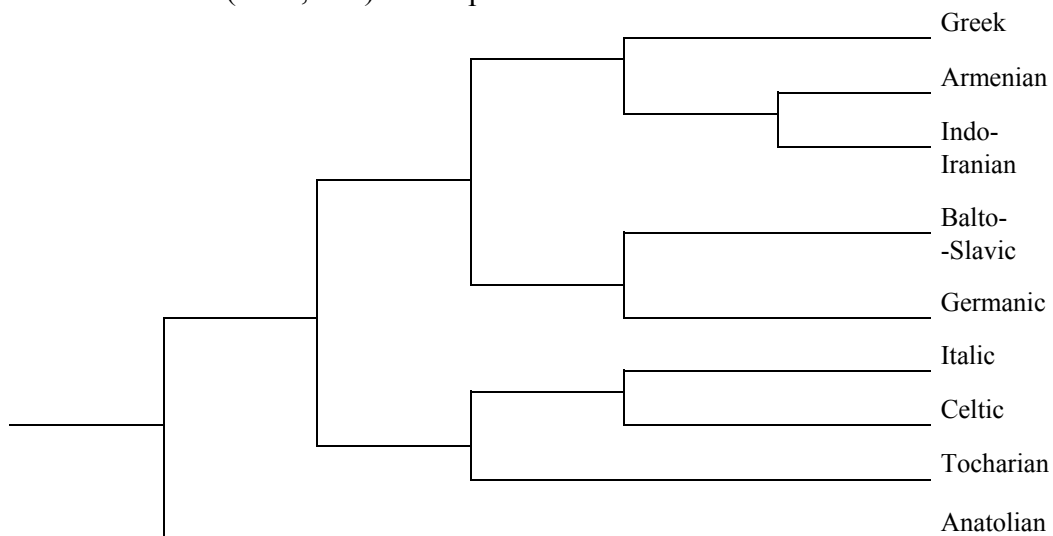
0. Indo-European

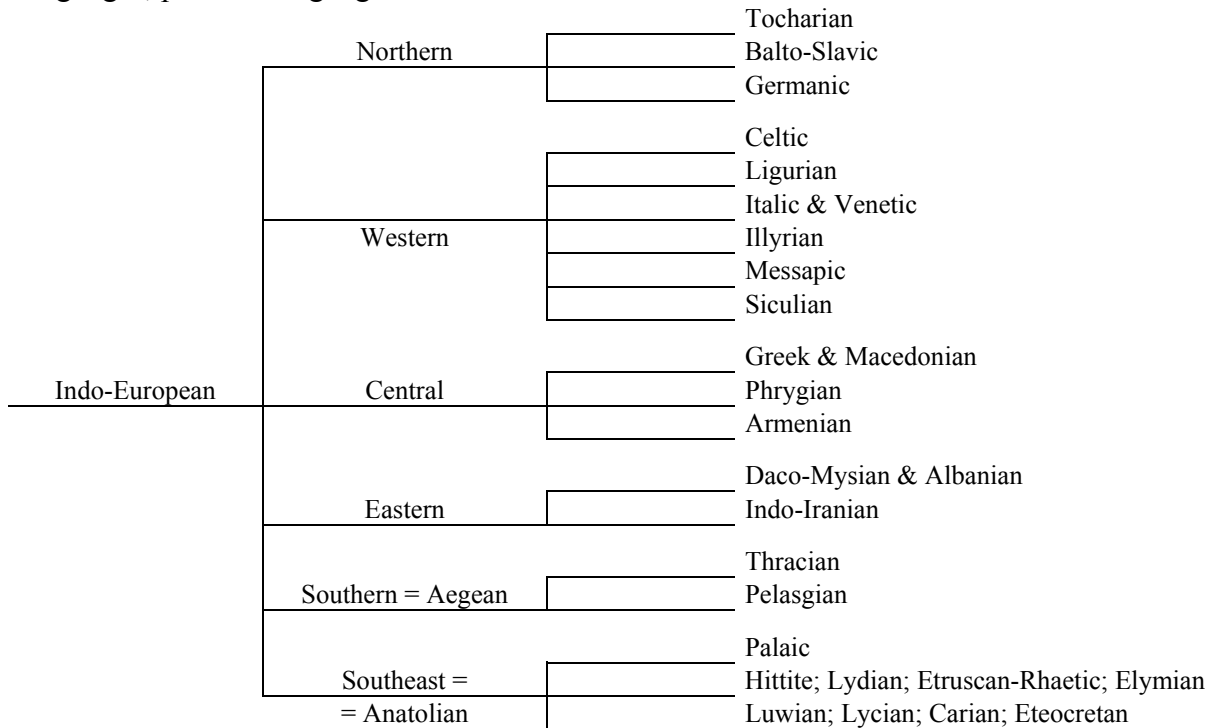0.1. In the 19th century the tree-diagram of A. Schleicher (1860) was very popular:
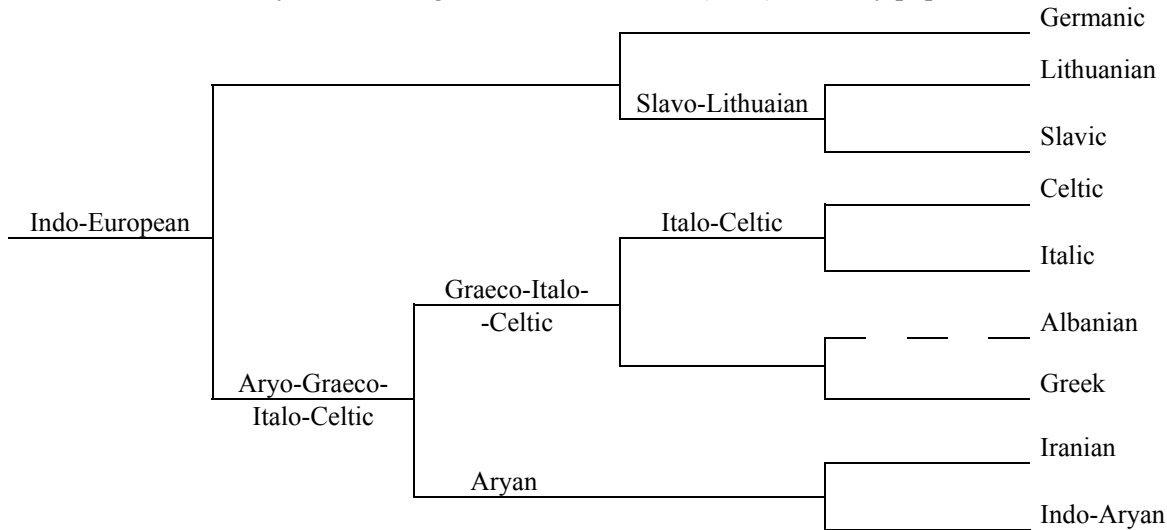
After the discovery of the Indo-European affiliation of the Tocharian A & B languages and the languages of ancient Asia Minor, it is necessary to take them in account. The models of the recent time accept the Anatolian vs. non-Anatolian ('Indo-European' in the narrower sense) dichotomy, which was first formulated by E. Sturtevant (1942). Naturally, it is difficult to include the relic languages into the model of any classification, if they are known only from several inscriptions, glosses or even only from proper names. That is why there are so big differences in classification between these scantily recorded languages. For this reason some scholars omit them at all.
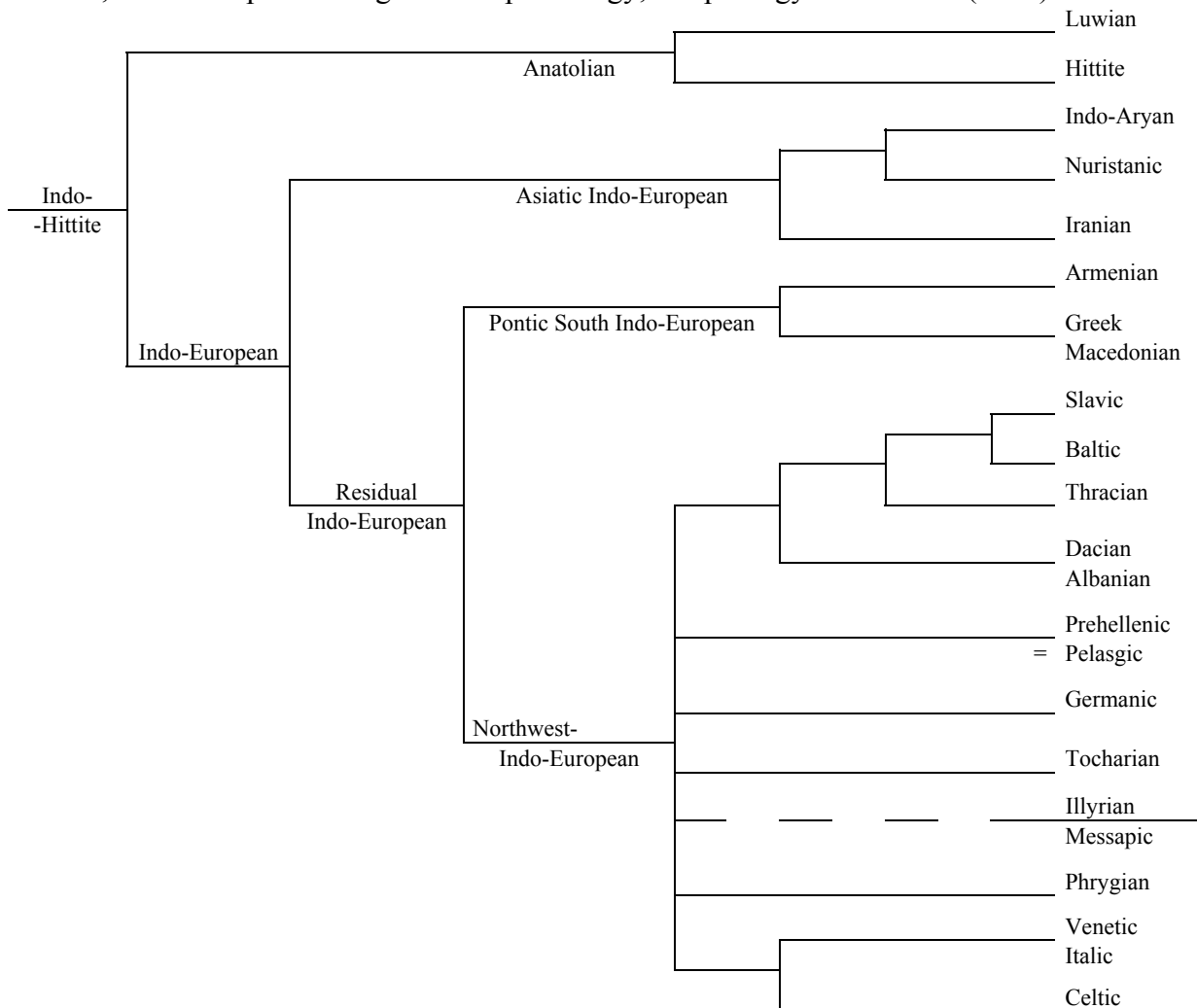
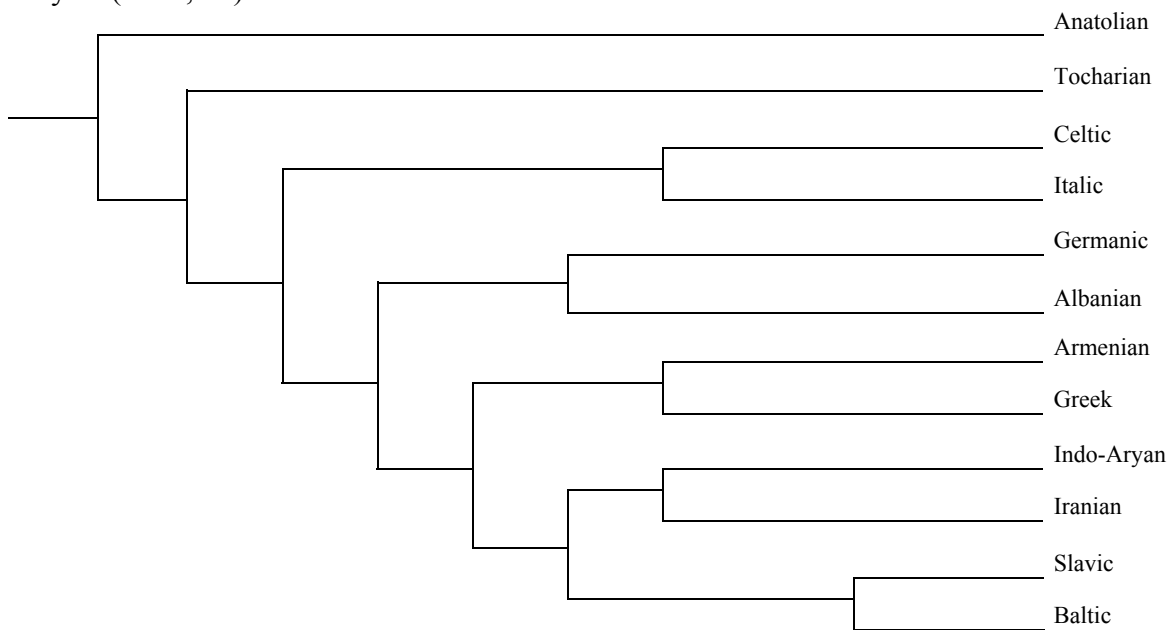0.2. Gamkrelidze & Ivanov (1984, 415) developed the traditional ideas:

0.3. Vladimir Georgiev (1981, 363) included in his Indo-European classification some of the relic languages, plus the languages with a doubtful IE affiliation at all:

```
                                        ┌── Tocharian
                     Northern ──────────┤── Balto-Slavic
                                        └── Germanic

                                        ┌── Celtic
                                        ├── Ligurian
                                        ├── Italic & Venetic
                     Western ───────────┤── Illyrian
                                        ├── Messapic
                                        └── Siculian

                                        ┌── Greek & Macedonian
Indo-European        Central ───────────┤── Phrygian
                                        └── Armenian

                                        ┌── Daco-Mysian & Albanian
                     Eastern ───────────┤
                                        └── Indo-Iranian

                                        ┌── Thracian
                     Southern = Aegean ─┤
                                        └── Pelasgian

                                        ┌── Palaic
                     Southeast =  ──────┤── Hittite; Lydian; Etruscan-Rhaetic; Elymian
                     = Anatolian        └── Luwian; Lycian; Carian; Eteocretan
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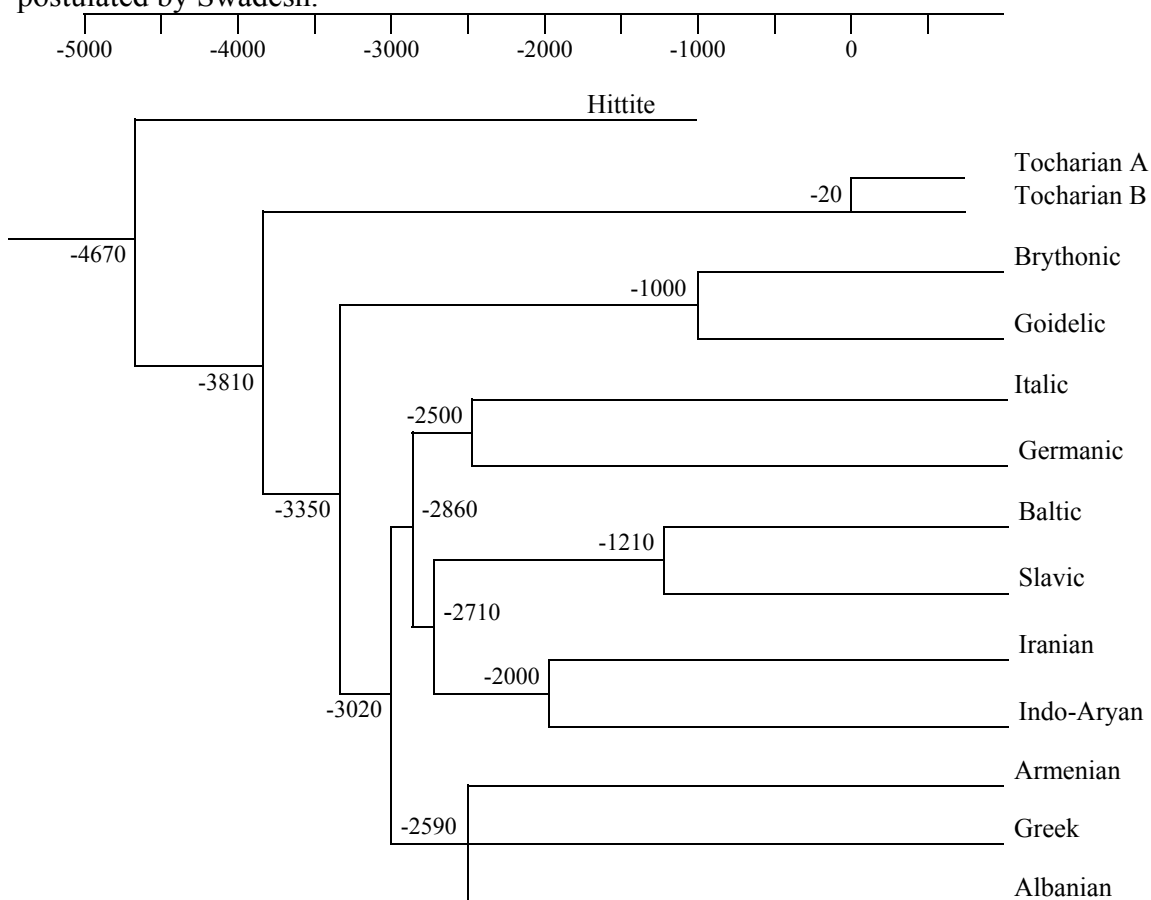
0.4. Eric Hamp proposed his original model of the Indo-European disintegration, including the relic idioms, based on specific isoglosses in phonology, morphology and lexicon (1990):

```
                                                                        ┌── Luwian
                              Anatolian ──────────────────────────────┤
                                                                        └── Hittite

                                                                        ┌── Indo-Aryan
                                                    Asiatic Indo-European ┤── Nuristanic
                                                                        └── Iranian

Indo-                                                                   ┌── Armenian
-Hittite                          Pontic South Indo-European ───────────┤── Greek
                                                                        └── Macedonian

                                                                            ┌── Slavic
                  Indo-European                                             ├── Baltic
                                                                            ├── Thracian
                                                                            └── Dacian

                                                                        ── Albanian

                                                                        ── Prehellenic
                                                                         = Pelasgic

                                                                        ── Germanic

                  Residual                                              ── Tocharian
                  Indo-European
                                                                        ── Illyrian
                                                                        ── Messapic

                                    Northwest-                          ── Phrygian
                                    Indo-European
                                                                            ┌── Venetic
                                                                            ├── Italic
                                                                            └── Celtic
```

0.5. As the illustration of a realistic application of cladistics can serve D. Ringe, T. Warnow & A. Taylor (2002, 87):

Anatolian
Tocharian
Celtic
Italic
Germanic
Albanian
Armenian
Greek
Indo-Aryan
Iranian
Slavic
Baltic

0.6. The absolute chronology is available only thanks to glottochronology. The most recent result of Sergei Starostin (*Workshop on the chronology in linguistics*, Santa Fe 2004) applies his own model of the 'recalibrated' glottochronology, where all borrowings are excluded before any calculation and the coefficient of changes is empirically recounted to 5% per millennium instead of 14% postulated by Swadesh.

| -5000 | -4000 | -3000 | -2000 | -1000 | 0 |

Hittite

Tocharian A
Tocharian B
-20

Brythonic
-1000
Goidelic

Italic
-2500
Germanic

Baltic
-1210
Slavic

Iranian
-2000
Indo-Aryan

Armenian
-2590
Greek

Albanian

-4670
-3810
-3350
-2860
-2710
-3020

1. Indo-Aryan

The only attempt to apply glottochronology for several modern Indo-Aryan languages in confrontation with Sanskrit was realized by S. Starostin and his team (database 2004):
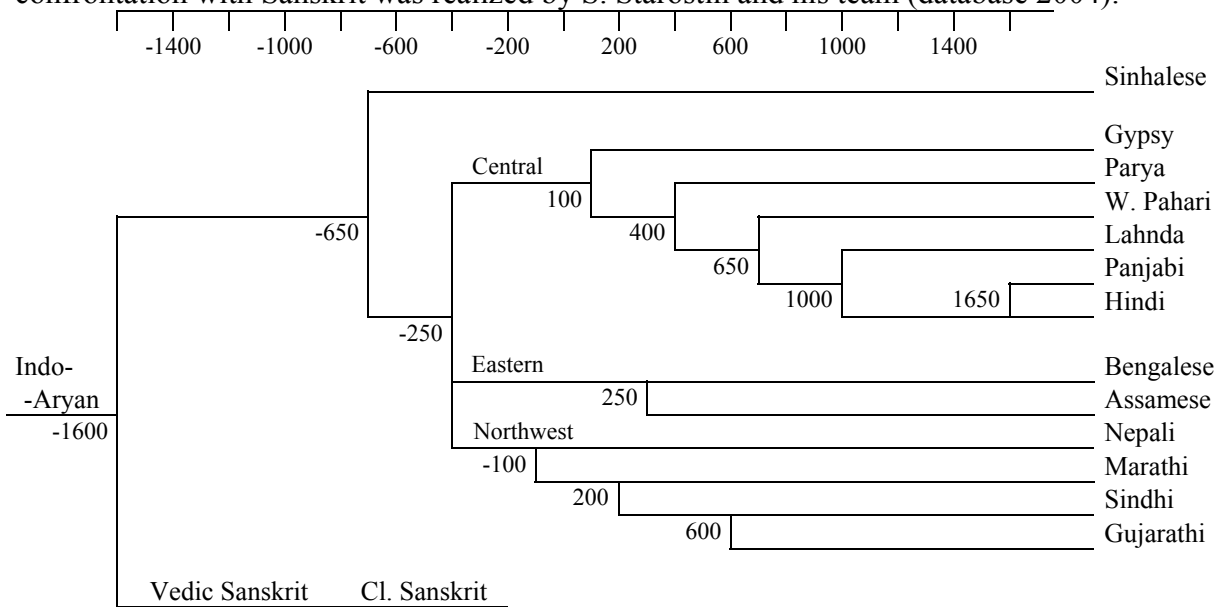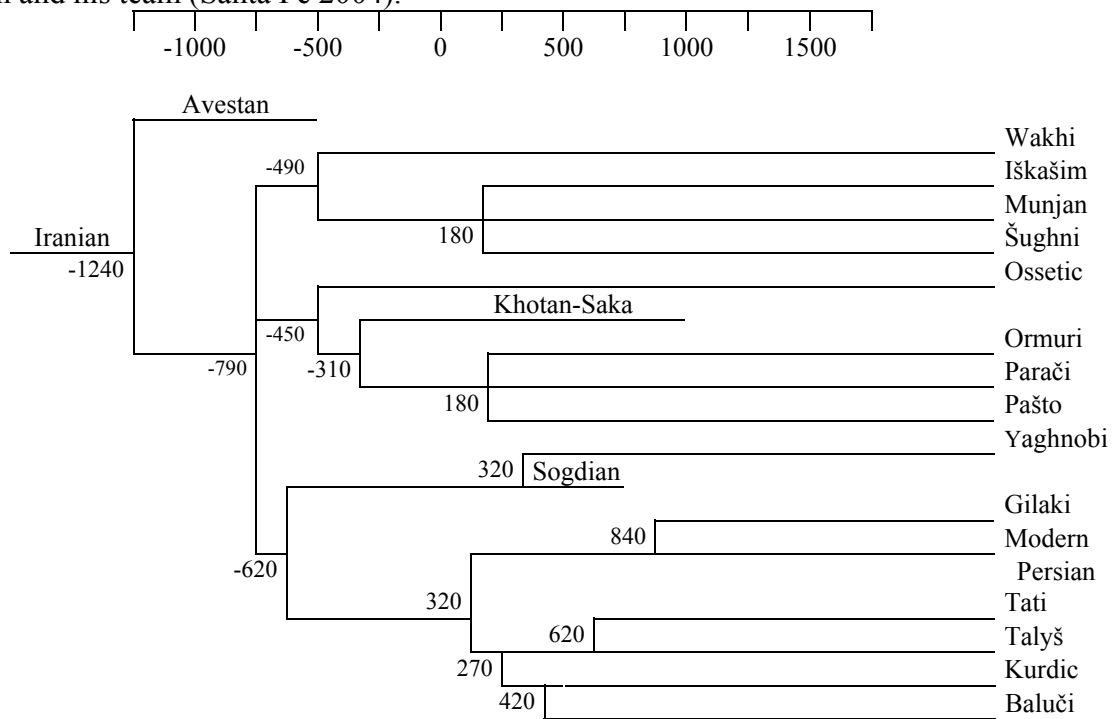

2. Dardic

The only tree-diagram was constructed by S. Starostin's team (database 2004):
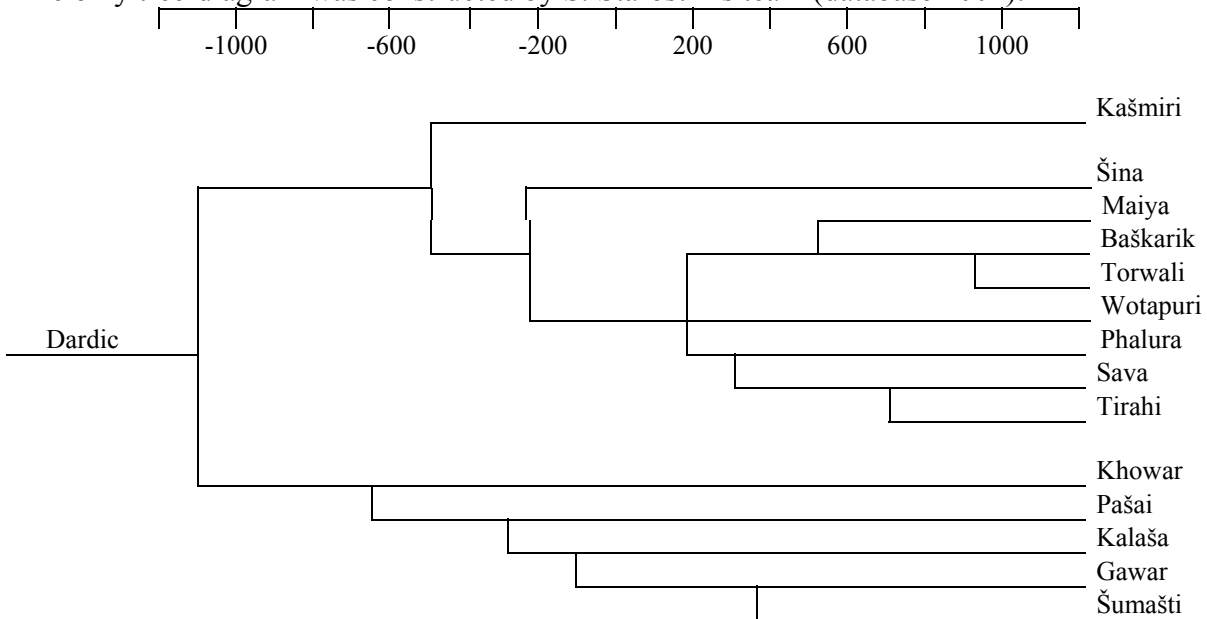
Note: Concerning the internal classification and depth of divergence of the **Nuristani** languages, there are no available results.

3. Iranian

The only attempt to construct the tree-diagram for the Iranian languages was realized by S. Starostin and his team (Santa Fe 2004).


4. Anatolian

With exception of Hittite no Anatolian language allows to apply glottochronology for our limited knowledge of their lexical corpora. That is why the existing classifications are based on combinations of phonological, morphological and lexical isoglosses. In the recent time these three alternative models of the internal classification of the Anatolian languages were proposed.
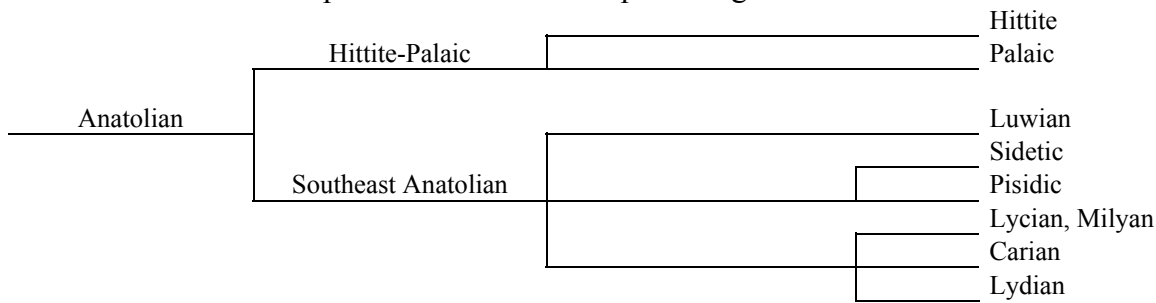
4.1. N. Oettinger 1978, 92 (supplemented on the basis of personal communication in 2001):
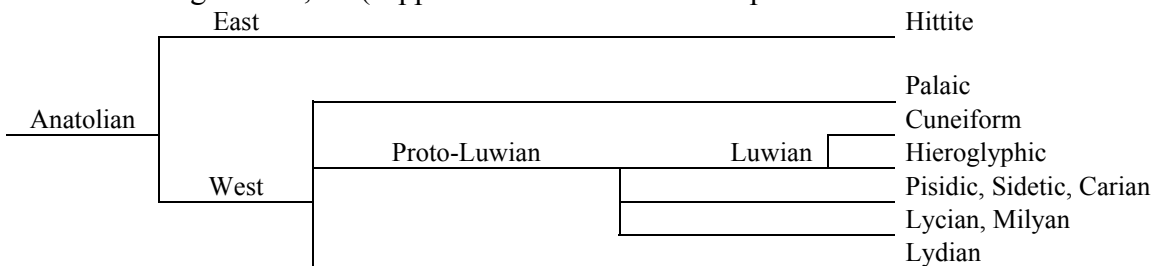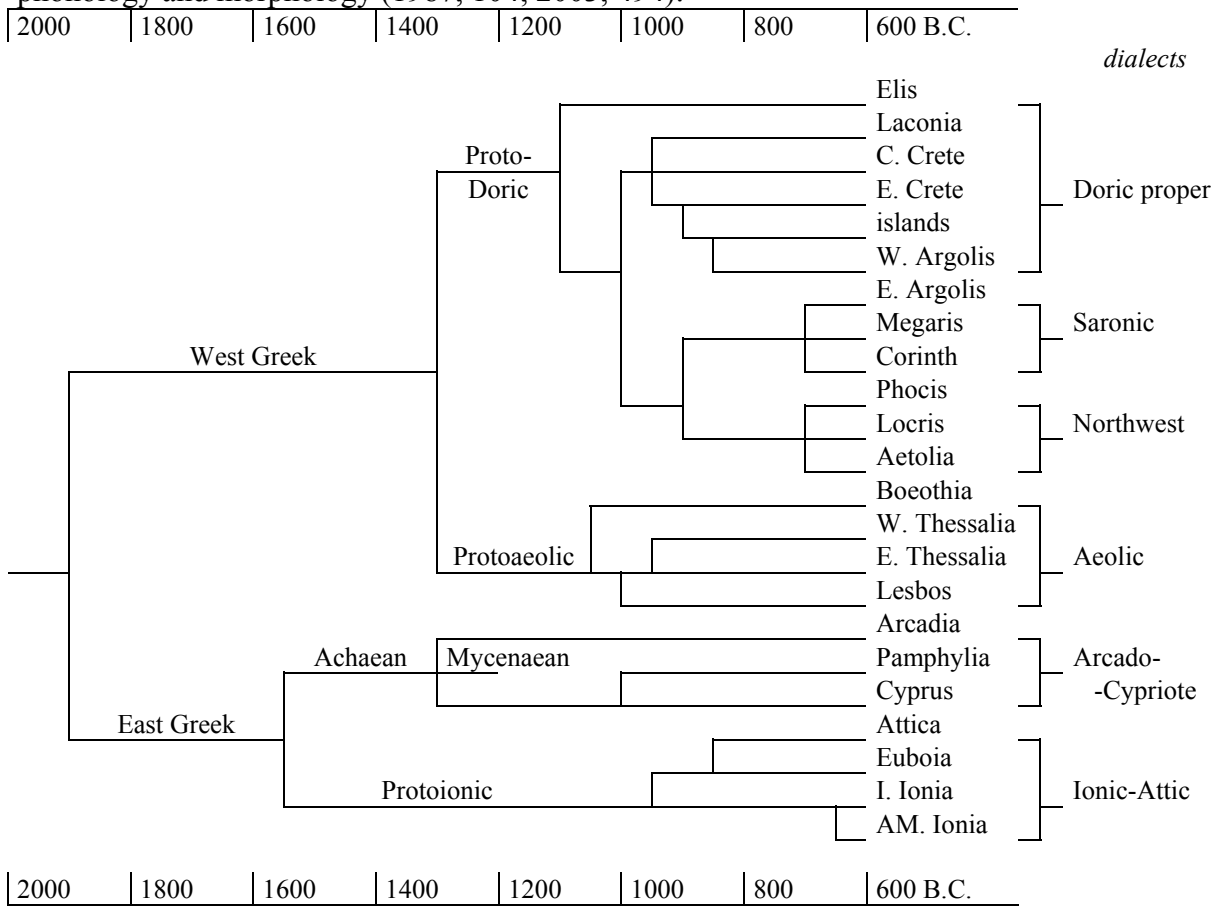

4.2. R. Werner (1991, 17)
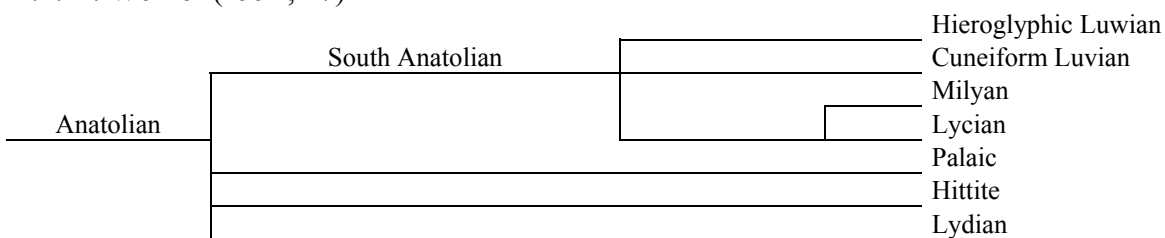
4.3. C. aan de Wiel <http://iiasnt.leidenuniv.nl/pie/ielangs/anatolian.html>

5. Greek

The most detailed scheme classifying the Greek dialects was proposed by A. Bartoněk on the basis of phonology and morphology (1987, 104; 2003, 494):

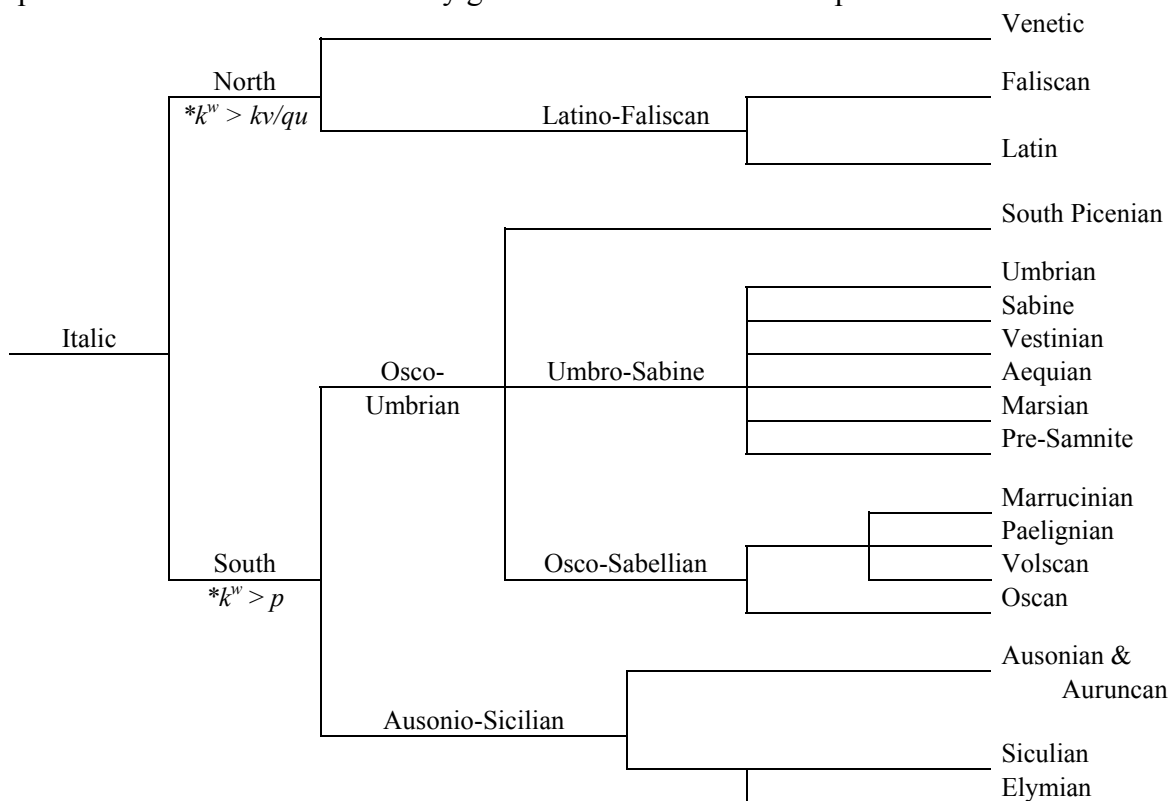Abbreviations: AM Asia Minor, C. Central, E. East, I. Insular, W. West.

Note: Greek can be classified as one of the **Hellenic** languages, together with Phrygian / Brygian, ancient Macedonian, and perhaps also Messapic, if the hypothesis of M. Huld (1995, 147-55) is accepted. Unfortunately, the lexical corpora do not allow any quantification.

6. Paleo-Balkanian

Extremously poor data and their ambiguous interpretations lead to various hypotheses. The present author finds as probable following: In Prehellenic = Pelasgian the *Lautverschiebung* operated; the language was of the *centum*-type (Hamp) rather than of *satem*-type (Georgiev). If Thracian & Bithynian were *satem*-languages with *Lautverschiebung*, their closer relation with Armenian is expectable (so Kortlandt 1988). Albanian is a descendant of Illyrian, both the *satem*-languages. The change $*g^w > b$ (Pisani 1957) in Dacian indicates more probably the *centum*-type, regarding the complementarity of the $*k : *k^w$ and $*k : *k'$ distinction.
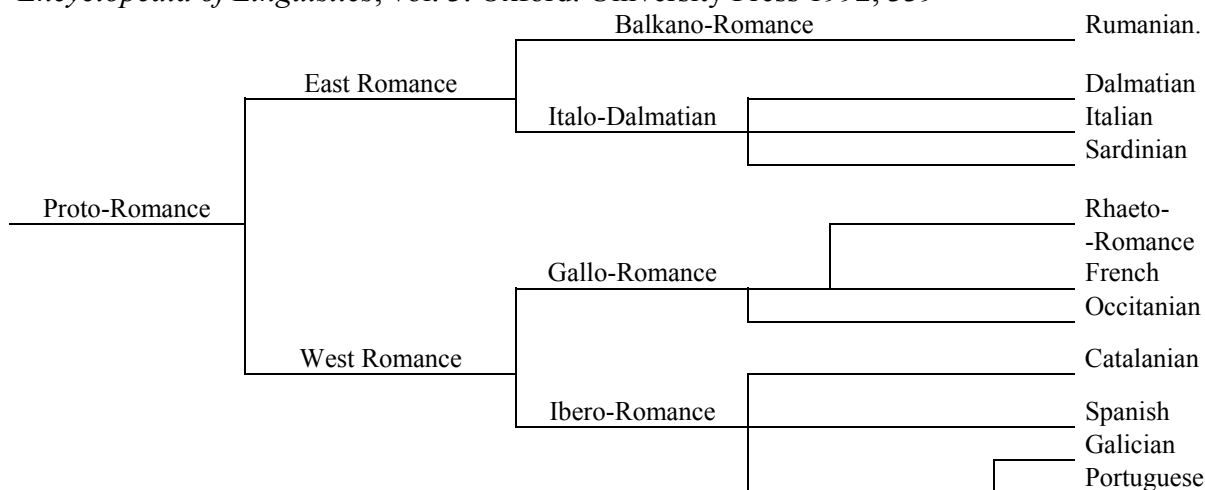
7. Italic

7.0. For ancient Italic languages the application of glottochronology is not possible, because their lexicons are very limited, naturally with exception of Latin. For this reason the following hypothetical classification is based only on unique common features in phonology, morphology and sporadically in lexicon (Coleman 1986). Older classifications see Wallace (1984, 149-51). The present model does not reflect any grade of a mutual relationship.

Italic
- North ($*k^w > kv/qu$)
  - Venetic
  - Latino-Faliscan
    - Faliscan
    - Latin
- South ($*k^w > p$)
  - Osco-Umbrian
    - South Picenian
    - Umbro-Sabine
      - Umbrian
      - Sabine
      - Vestinian
      - Aequian
      - Marsian
      - Pre-Samnite
    - Osco-Sabellian
      - Marrucinian
      - Paelignian
      - Volscan
      - Oscan
  - Ausonio-Sicilian
    - Ausonian & Auruncan
    - Siculian
    - Elymian

7A. Romance

On the other hand, the lexical material of the Romance languages served for determination of the basic constants in glottochronology. Let us confront several models of their disintegration:

7A.1. Suzanne Fleischman. The Romance Languages, in: William Bright (ed.), *International Encyclopedia of Linguistics*, vol. 3. Oxford: University Press 1992, 339

Proto-Romance
- East Romance
  - Balkano-Romance
    - Rumanian.
  - Italo-Dalmatian
    - Dalmatian
    - Italian
    - Sardinian
- West Romance
  - Gallo-Romance
    - Rhaeto-Romance
    - French
    - Occitanian
  - Ibero-Romance
    - Catalanian
    - Spanish
    - Galician
    - Portuguese

7A.2. Joseph E. & Barbara F. Grimes 1996, 57-58.

```
                                                                North ─┬─ Istro-Rumanian
                                              East ──────────────────┤   └─ Daco-Rumanian
                                                                South ─┬─ Arumanian
                                                                       └─ Megleno-
                                                                          -Rumanian

                               Italo-      ──────────────────── Dalmatian
                               -Romance                        Italian dialects
                                                                 (incl. Friulian)
                                                              Ligurian
                                              Rhaeto-        Lombardian
                               Gallo-        -Romance        Romansch
                               -Romance                      Ladin

Proto-Romance ── Italo-West                                  Piemontese
                                                             Franco-Provençal
                                                             French
                               West                         Occitan dialects
                                              East           Catalan
                                              Central        Spanish dialects
                                                             Galician
                               Ibero-        West            Portuguese
                               -Romance      South           Mozarabian

                                                             South Corsic
                               South                         Sardinian dialects
```

7A.3. Merritt Ruhlen 1987, 326:

```
                                                              Istro-Rumunian
                                                              Rumunian
                                    East                      Arumunian
                                                              Megleno-Rumunian

                                          Italo-Romance      Dalmatian
                 Continental                                 Italian

                                          Raeto-Romance      Friulian
                                                             Ladinish
                 West                                        Romansch

                                                             Franco-Provençal
Proto-                                    Galo-Romance       French
-Romance                                                     Occitan

                                          Gallo-Ibero-
                                          -Romance           Catalanian
                                                             Spanish
                                          Ibero-             Galician
                                          -Romance           Portugal
                                                             Mozarabian

                 Insular                                     Sardinian
```
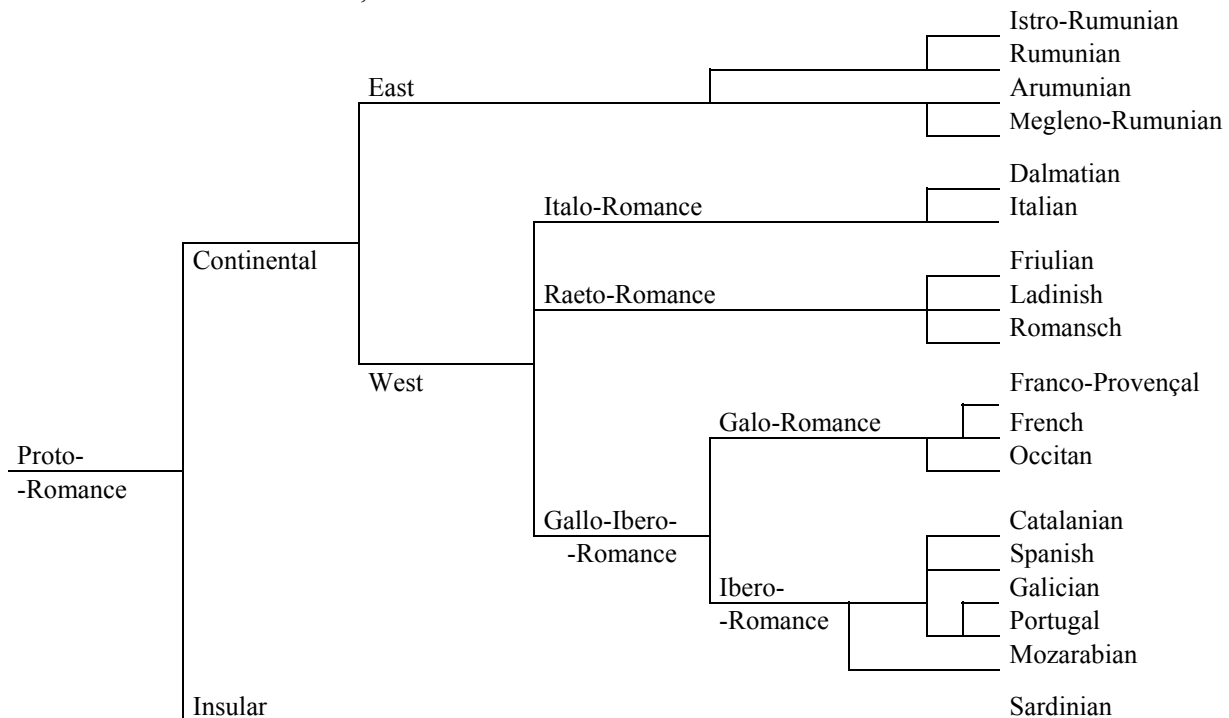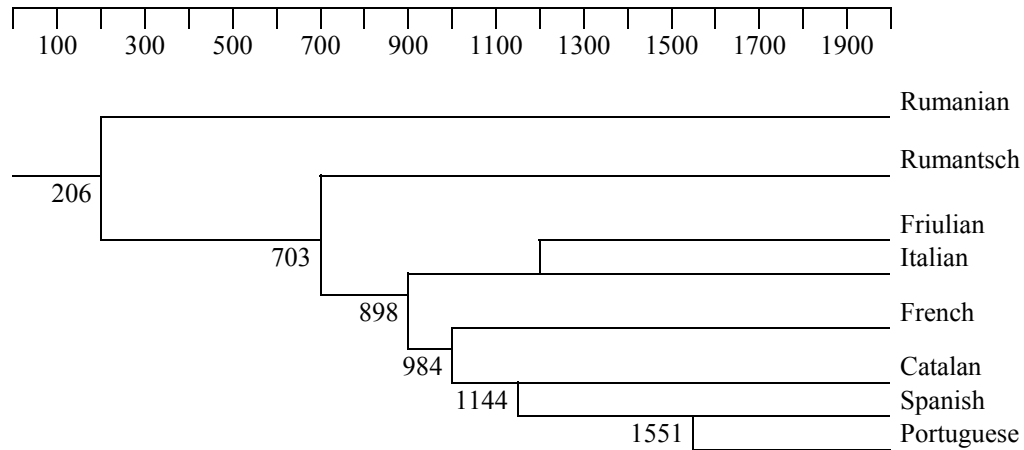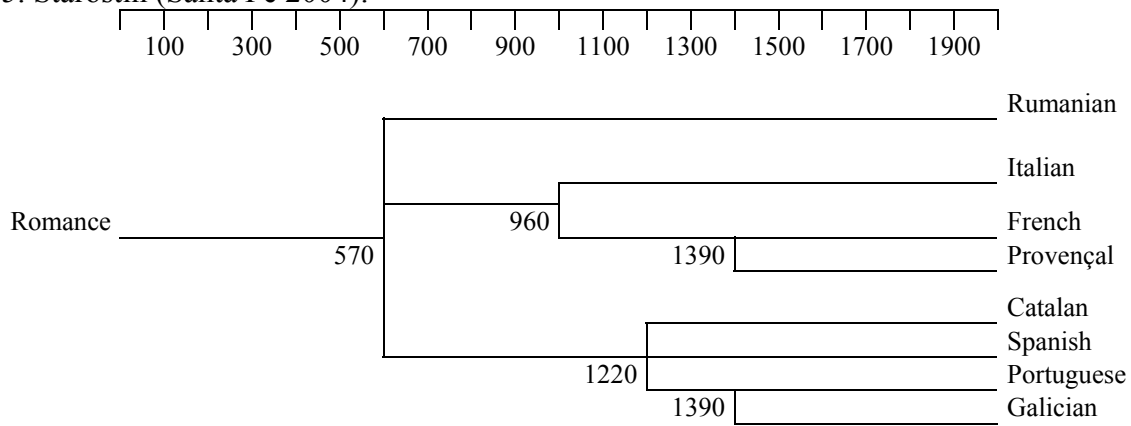
7A.4. It is natural that glottochronology was also applied for Romance languages. Let us confront two attempts from the recent time:
Embleton (1986, 142):

Tree diagram (top)

Scale: 100 300 500 700 900 1100 1300 1500 1700 1900

- Rumanian
- Rumantsch
- Friulian
- Italian
- French
- Catalan
- Spanish
- Portuguese

Nodes: 206, 703, 898, 984, 1144, 1551

7A.5. Starostin (Santa Fe 2004):

Scale: 100 300 500 700 900 1100 1300 1500 1700 1900

Romance

- Rumanian
- Italian
- French
- Provençal
- Catalan
- Spanish
- Portuguese
- Galician

Nodes: 570, 960, 1390, 1220, 1390

8. In the area between Italic and Celtic there were at least two relic languages which could form a closer unit in the genealogical sense: **Ligurian** and **Lusitanian**, former reconstructed on the basis of proper names attested by classical authors in northern Italy, latter known from several inscriptions written in the Latin alphabet, discovered in south Portugal and Spain.

9. Celtic
There are two alternative models of disintegration of the Celtic languages.
9.1. The first model has to reflect the opposition between the insular and continental languages. It is defended e.g. by W. Cowgill (1975) or P. Schrijver (1995, 463).
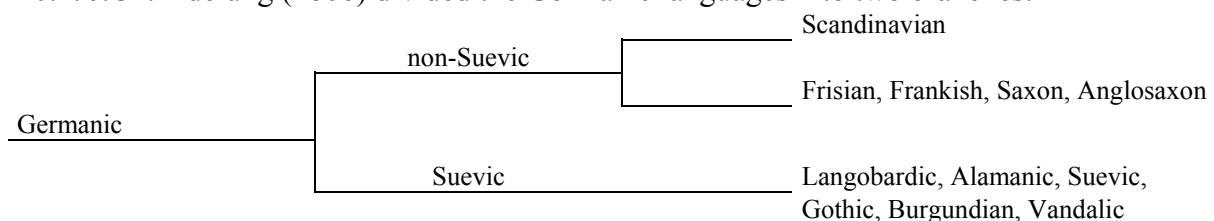
Celtic
- Insular
  - Goidelic
  - Brythonic
- Continental
  - Gaulish & Lepontic
  - Celtiberian
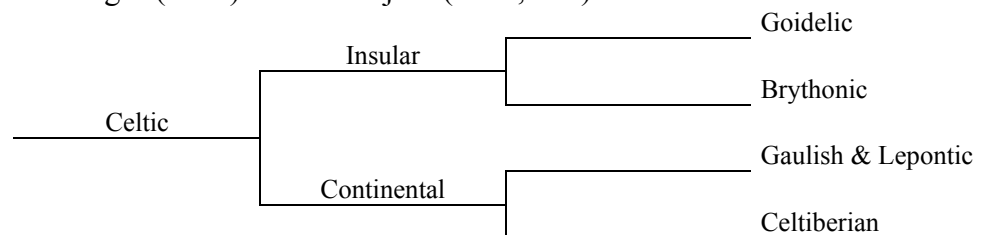
9.2. The alternative and more traditional model is based on the *q/p*-isogloss in the reflexes of the Indo-European labiovelar *k^w*. The figures for living languages (plus Cornish) and the age of the divergence of Goidelic vs. Brythonic were calculated by S. Starostin and his team (Santa Fe 2004). The positions of other nodes indicated by question marks represent only rough assessments:

Celtic tree diagram:

Timeline: -1000 -600 -200 200 600 1000

```
*kʷ > q
  ?                                          Celtiberian

              Goidelic        900            Irish
                                             Gaelic
                                             Manx
Celtic
-1100
                                             Pictish
                        ?
                    Brythonic   ?            Cumbrian
                        370                  Welsh
*kʷ > p                                      Cornish
  ?                     1020                  Breton

                                             Gaulish
                                             Lepontic
```
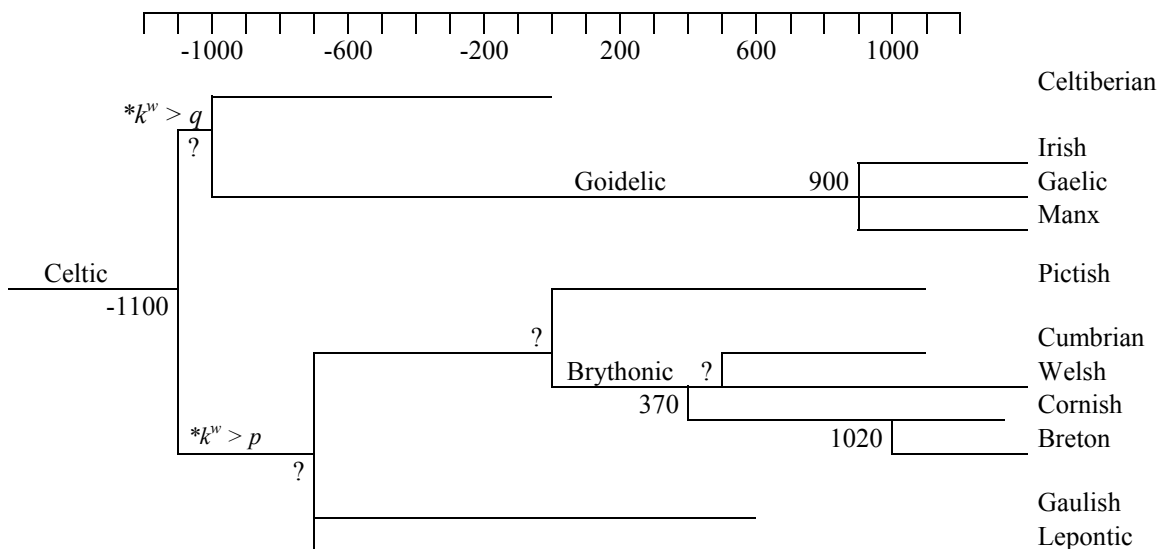
10. Germanic

The best summarization of various ideas concerning the classification of the Germanic languages is the study of W. Mańczak (1992; cf. also Blažek & Pirochta 2004).

10.1. J.Ch. Adelung (1806) divided the Germanic languages into two branches:

```
                                             Scandinavian
                    non-Suevic
                                             Frisian, Frankish, Saxon, Anglosaxon
Germanic
                                             Langobardic, Alamanic, Suevic,
                    Suevic                   Gothic, Burgundian, Vandalic
```

10.2. Similarly J. Grimm (1819) operated with the binary classification. For some of the tribal dialects he supposed the transit character, viz. Frisian & Anglian (1-2), Frankish (2-3), Quadic & Marcomanic (3-4). Alternatively he assumed the opposition of East Germanic vs. others.

```
                    Scandinavian   Nordic
              1)
              2)    Low German     Saxon, Westfalian, Frisian, Anglosaxon
Germanic
                    High German    Langobardic, Burgundian, Bavarian, Alamanic, Frankish
              3)
              4)                   Gothic, Gepidic, Herulic, Vandalic
```
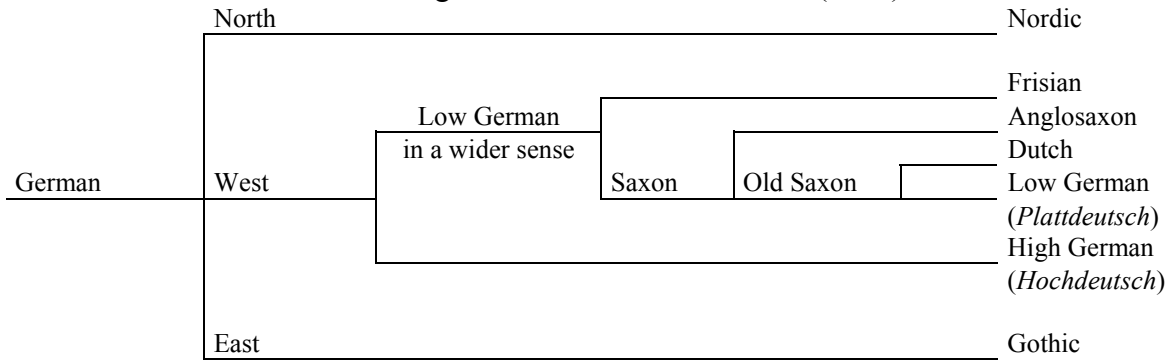
10.3. Applying his original method based on the lexicostatistic analysis of parallel texts, Mańczak (1992) formulated a similar conclusion. He ordered the languages decliningly according their relationship with Gothic: the closest has to be Old High German, further Old Saxon, finally Scandinavian languages.
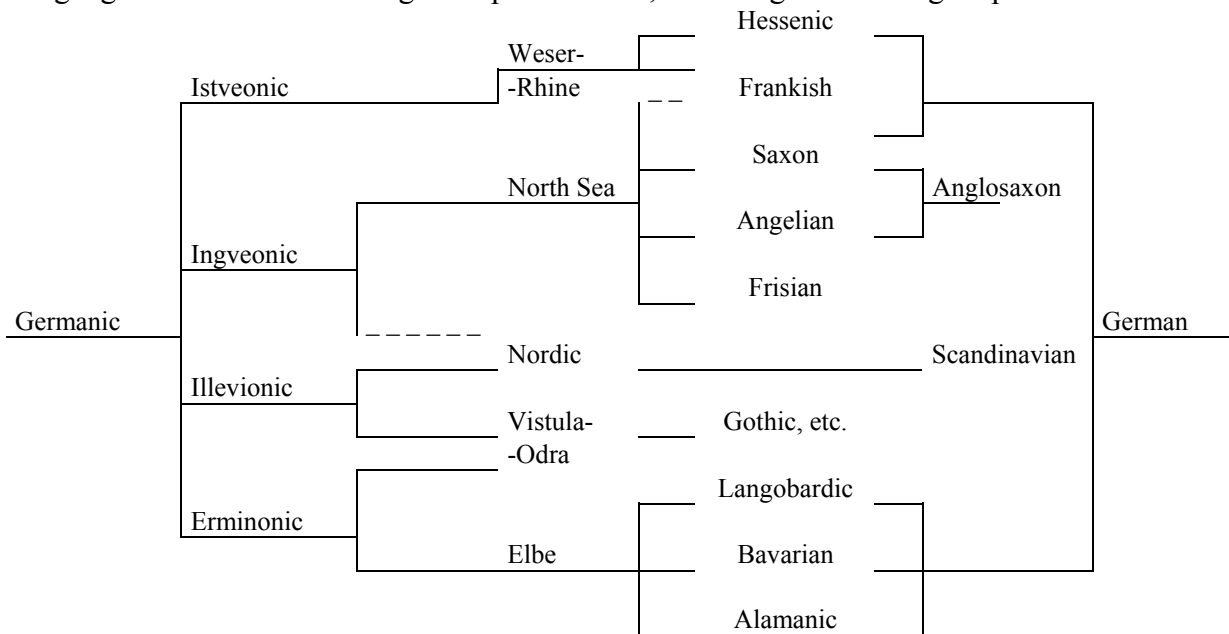
10.4. Another model of the binary classification was presented by K. Müllenhoff (1898):

```
                                             Nordic
                    East Germanic
                                             Gothic.
Germanic
                                             Urdeutsch
                    West Germanic
                                             Anglo-Frisian
```
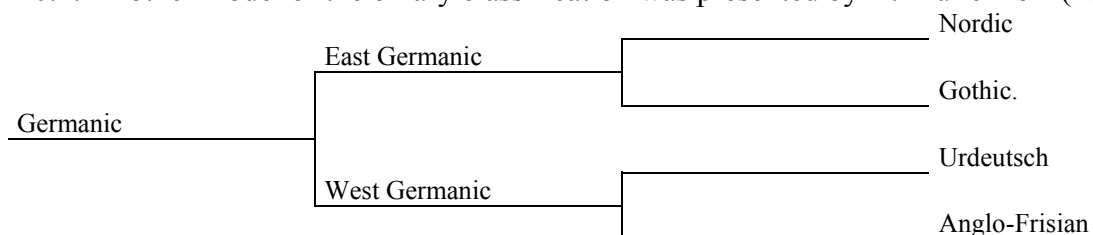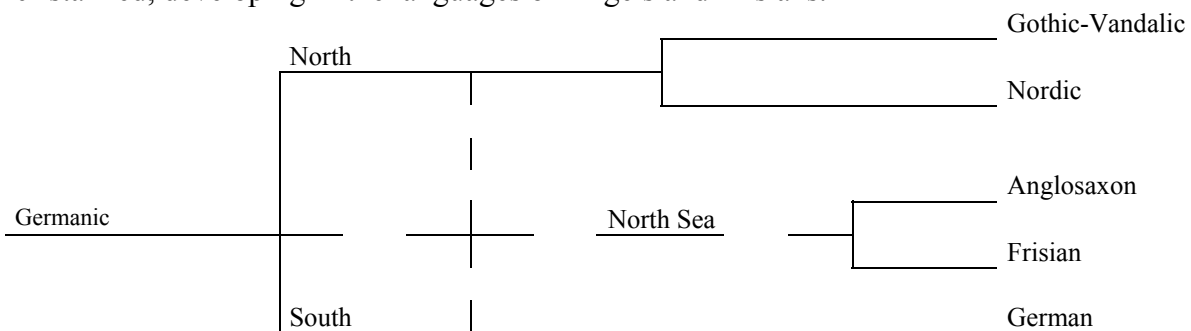
10.5. The most frequent model divides the Germanic languages into three branches: East, North and West. The author of the following classification is J. Schmidt (1860):
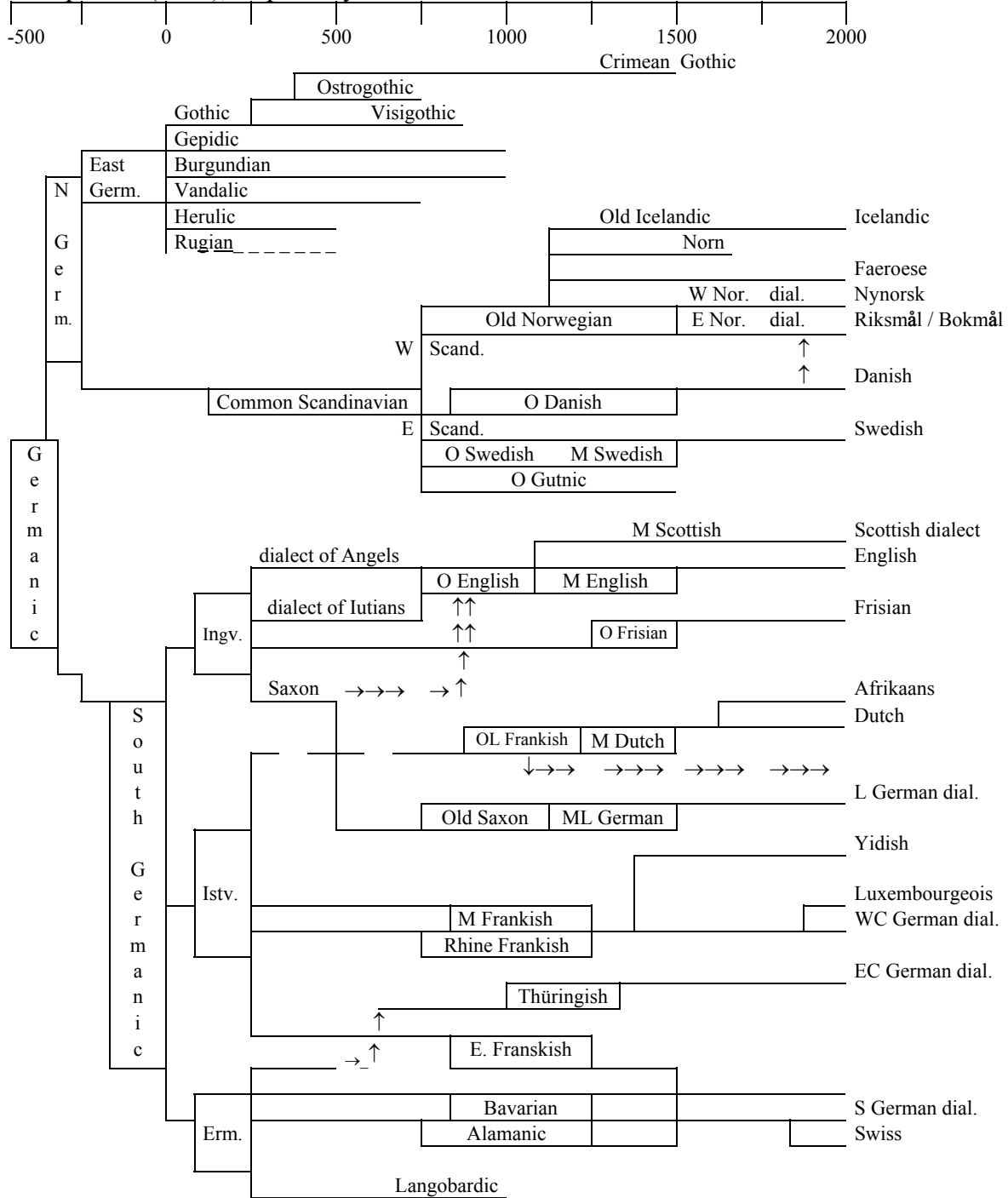
```
North                                          Nordic

                                               Frisian
              Low German                       Anglosaxon
              in a wider sense                 Dutch
German   West                Saxon   Old Saxon Low German
                                               (Plattdeutsch)
                                               High German
                                               (Hochdeutsch)

East                                           Gothic
```

10.6. F. Maurer (1943) tried to depict the development from the tribal Germanic dialects to the languages of the late middle age and present time, including the convergent processes:

```
                                       Hessenic
                         Weser-
           Istveonic     -Rhine        Frankish

                                       Saxon
                         North Sea                Anglosaxon
           Ingveonic                   Angelian

                                       Frisian
Germanic                                          Scandinavian          German
                         Nordic
           Illevionic
                         Vistula-      Gothic, etc.
                         -Odra
                                       Langobardic
           Erminonic
                         Elbe          Bavarian

                                       Alamanic
```

10.7. E. Schwarz (1951) assumed that c. 200 B.C. the Germanic language continuum was already divided into the North zone, generating the later Scandinavian languages and Gothic, and the South zone, where the later German dialects were formed. About 4 cent. later the third, transit zone, cristalized, developing in the languages of Angels and Frisians.

```
                                               Gothic-Vandalic
           North
                                               Nordic


                                               Anglosaxon
Germanic                   North Sea
                                               Frisian

           South                               German
```

10.8. The most detailed scheme of the development of the Germanic languages was proposed by T.V. Toporova (2000), inspired by Maurer and Schwartz:

-500	0	500	1000	1500	2000

Crimean Gothic

Ostrogothic
Gothic   Visigothic
Gepidic
East   Burgundian
Germ.   Vandalic
N   Herulic   Old Icelandic   Icelandic
G   Rugian _ _ _ _ _ _   Norn
e
r   Faeroese
m.   W Nor.   dial. Nynorsk
                        Old Norwegian   E Nor.   dial. Riksmål / Bokmål
            W | Scand.   ↑
G   ↑   Danish
e   Common Scandinavian   O Danish
r   E | Scand.   Swedish
m   O Swedish   M Swedish
a   O Gutnic
n
i   M Scottish   Scottish dialect
c   dialect of Angels   English
            O English   M English
            dialect of Iutians ↑↑   Frisian
            Ingv.   ↑↑   O Frisian
                         ↑
            Saxon   →→→   →↑   Afrikaans
                                                  Dutch
            OL Frankish   M Dutch
S   ↓→→   →→→   →→→   →→→
o   L German dial.
u   Old Saxon   ML German
t
h   Yidish
            Istv.   Luxembourgeois
G   WC German dial.
e   M Frankish
r   Rhine Frankish
m   EC German dial.
a   Thüringish
n   ↑
i   →_↑   E. Franskish
c
            Erm.   Bavarian   S German dial.
                          Alamanic   Swiss
            Langobardic

Abbreviations: C Central, dial. dialect, E East, Erm. Erminonic, Germ. Germanic, Ingv. Ingveonic, Istv. Istveonic, L Low, M Middle, Nor. Norwegian, O Old, S South, Scand. Scandinavian, W West.

10.9. E. Antonsen (1975) assumed the opposition of the east and northwest branches:

North

Northwest
Old Runic   West

Germanic

East   Gothic
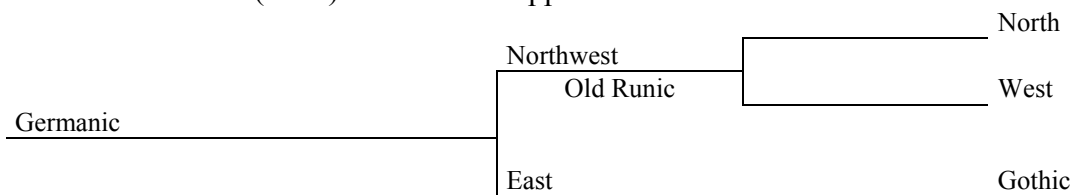
10.10. H. F. Nielsen (2000) returned to the traditional idea, identifying in Old Runic a direct ancestor only of the Scandinavian languages:
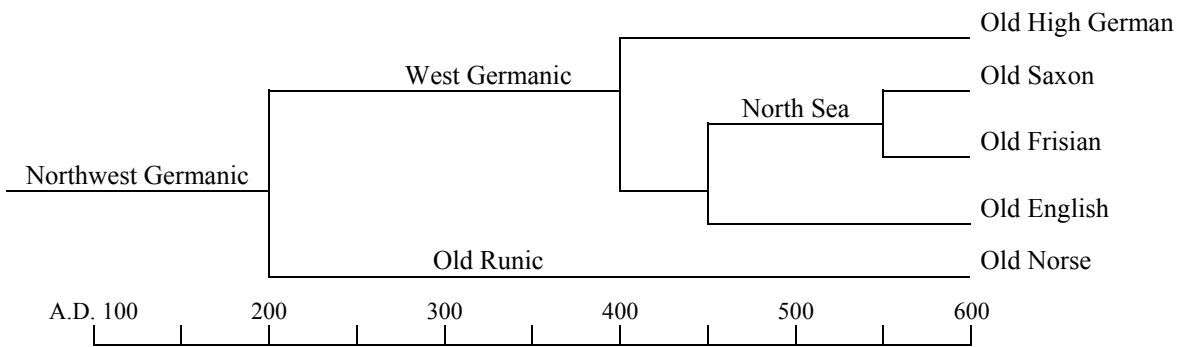
10.11. For her classification of the Germanic languages Sheila Embleton (1986, 117) used her modification of glottochronology:
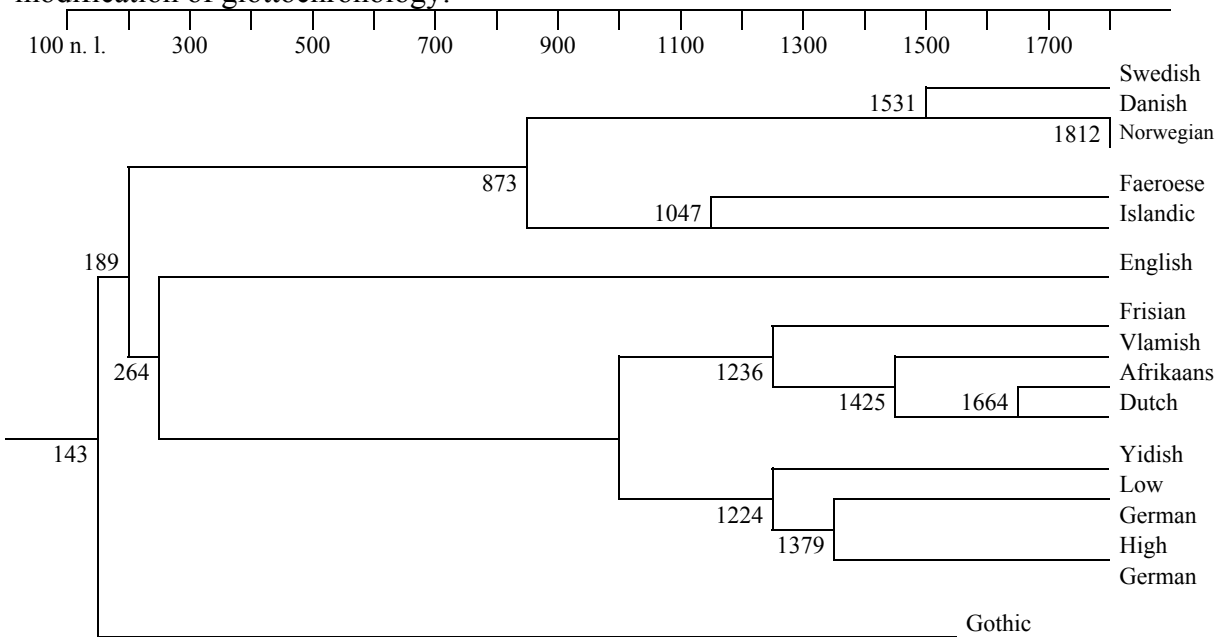
10.12. The most recent attempt to classify the Germanic languages was published by Starostin & Burlak (2001, 82-105). They applied Starostin's recalibrated glottochronology for 7 literary living languages and Gothic.
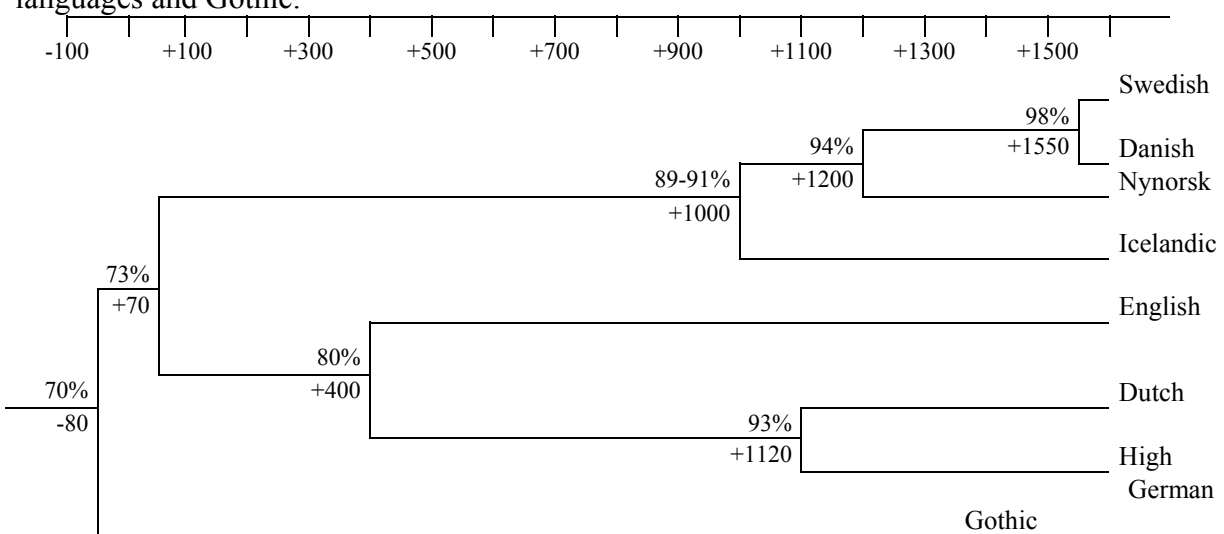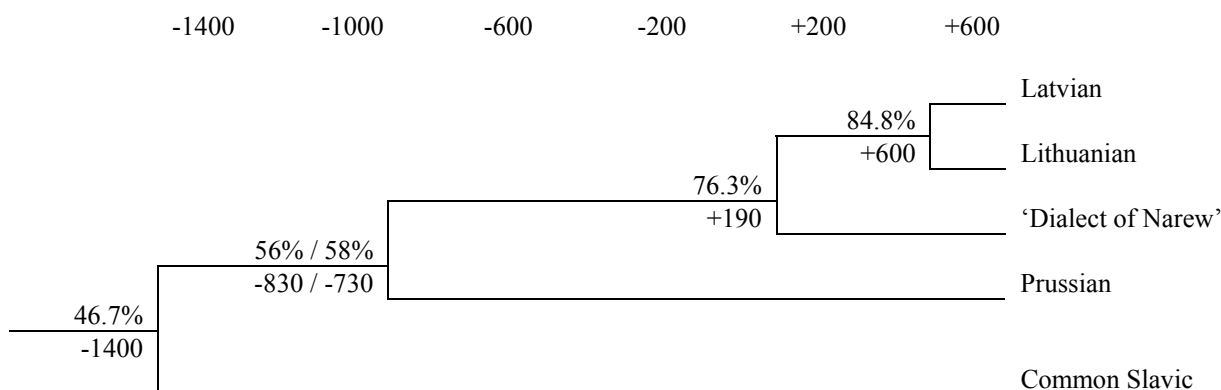
11. Baltic

According to tradition, the Baltic languages are divided into the west part represented by Old Prussian, from c. 1700 extinct, and eastern part, represented by the living languages, Lithuanian and Latvian. But the Baltic dialectology was much more complex a millennium ago. The following model was proposed by V. Mažiulis (1981):

```
                                                              Zemgalian
                          North periphery  ┌───────────────── Selian
                        ┌──────────────────┤
                        │                  └───────────────── Couronian
                        │
                        │                                     Latvian
Baltic ─────────────────┤  Central         ┌───────────────── 
                        │                  └───────────────── Lithuanian
                        │
                        │                                     Yatvingian
                        └──────────────────┬───────────────── Prussian
                          South periphery  └───────────────── Galindian
```
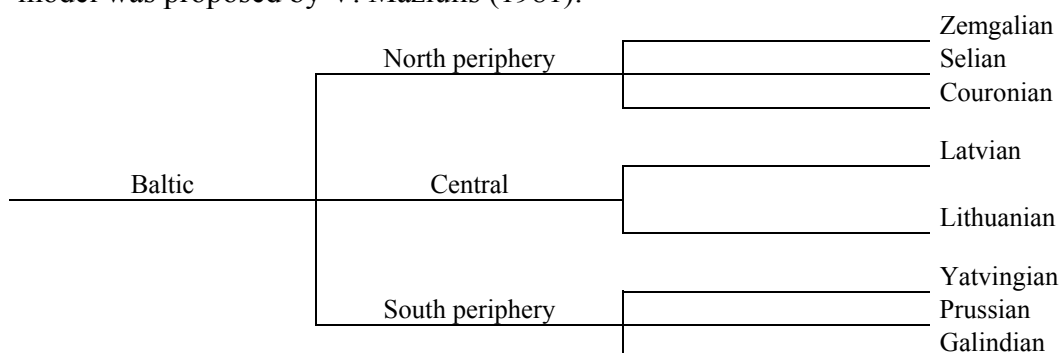
The first serious application of the classical glottochronology was used by Lanszweert (1984, xxxii-xxxvii), who has found 58,6% for Prussian vs. Lithuanian and 55,2% for Prussian vs. Latvian. The results of Girdenis & Mažiulis (1994, 9) are lower: 68% Lithuanian vs. Latvian, 49% Lithuanian vs. Prussian, 44% Latvian vs. Prussian. Starostin (Santa Fe 2004 and p.c., June 2005) dated the separation of Lithuanian and Latvian to 80 B.C., Lithuanian and the 'Dialect of Narew' to 30 B.C., Latvian and the 'Dialect of Narew' to 230 B.C. The position of Prussian in his calculations is rather strange, it has to be closer to Slavic than to Baltic. Novotná & Blažek (forthcoming), calculating the synonyms too, have reached the following results:

```
   -1400      -1000       -600       -200       +200       +600


                                                          84.8% ┌──── Latvian
                                                          +600  └──── Lithuanian
                                                   76.3% ┌─────────── 
                                                   +190  └─────────── 'Dialect of Narew'
                                  56% / 58% ┌────────────────────────
                                 -830 / -730 └──────────────────────── Prussian
                          46.7% ┌──────────────────────────────────── 
                          -1400 └──────────────────────────────────── Common Slavic
```

The double-result 58/56% for Prussian vs. other Baltic languages reflects the calculation without / with the 'Dialect of Narew'. The score 43% between Prussian and the 'Dialect of Narew' (*Pogańske gwary z Narewu*; see Zinkevičius 1984) in confrontation with 62% and 55.2% for Prussian vs. Lithuanian and Prussian vs. Latvian respectively, excludes the identification of the 'Dialect of Narew' with the historical Yatwingians, known from the Middle Ages, if their language had to be connected with the other Baltic idioms of the southern periphery, including Prussian. Regarding this big difference, it seems better to accept the explanation of Schmid (1986) who identified in the 'Dialect of Narew' a strong influence of Northeast Yiddish, spoken in the big cities of Lithuania and Latvia, hence the hybrid East Baltic - German idiom.

12. Slavic

12.1. According to the traditional model the Slavic languages are divided into three parts (cf. e.g. J. & B. Grimes 1996, 58):

```
                                                              Russian
                        East Slavic                           Belorussian
                                                              Ukrainian & Rusyn

                                                              Polish
                                        Lechitic              Kašubian
                                                              Pomerian Slovincian
                                                              Polabian

Slavic                  West Slavic     Sorbian               Lower Sorbian
                                                              Upper Sorbian

                                        Czech-Slovak          Czech
                                                              Slovak

                                                              Slovenian
                                                              Serbo-Croatian
                        Slouth Slavic
                                                              Macedonian
                                                              Bulgarian
```
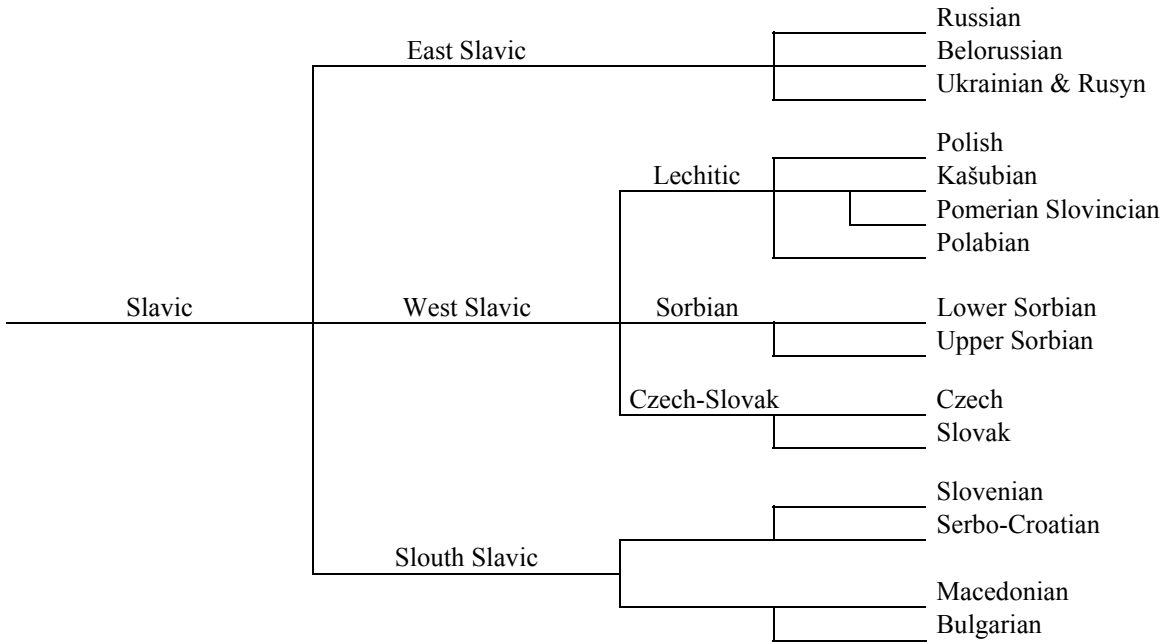
12.2. The classification of the Slavic languages by Starostin (Santa Fe 2004), using his recalibrated glottochronology, is revolutionary in both topology and chronology:

```
0       200     400     600     800     1000    1200    1400

                                                              Macedonian
        South Slavic
                                            1000              Bulgarian

                                                              Russian
        East Slavic                                           Ukrainian
                                    800
130                                                 1390      Belorussian

                                                              Polabian
                                                              Upper
                                                              Lusatian
270                             840
                                            1300              Lower
                                                              Lusatian

        420                                                   Polish
        West Slavic                                           Slovak
                            780
                                    960                       Czech
                670
                                                              Slovenian
                            1080                              Serbian
```

15
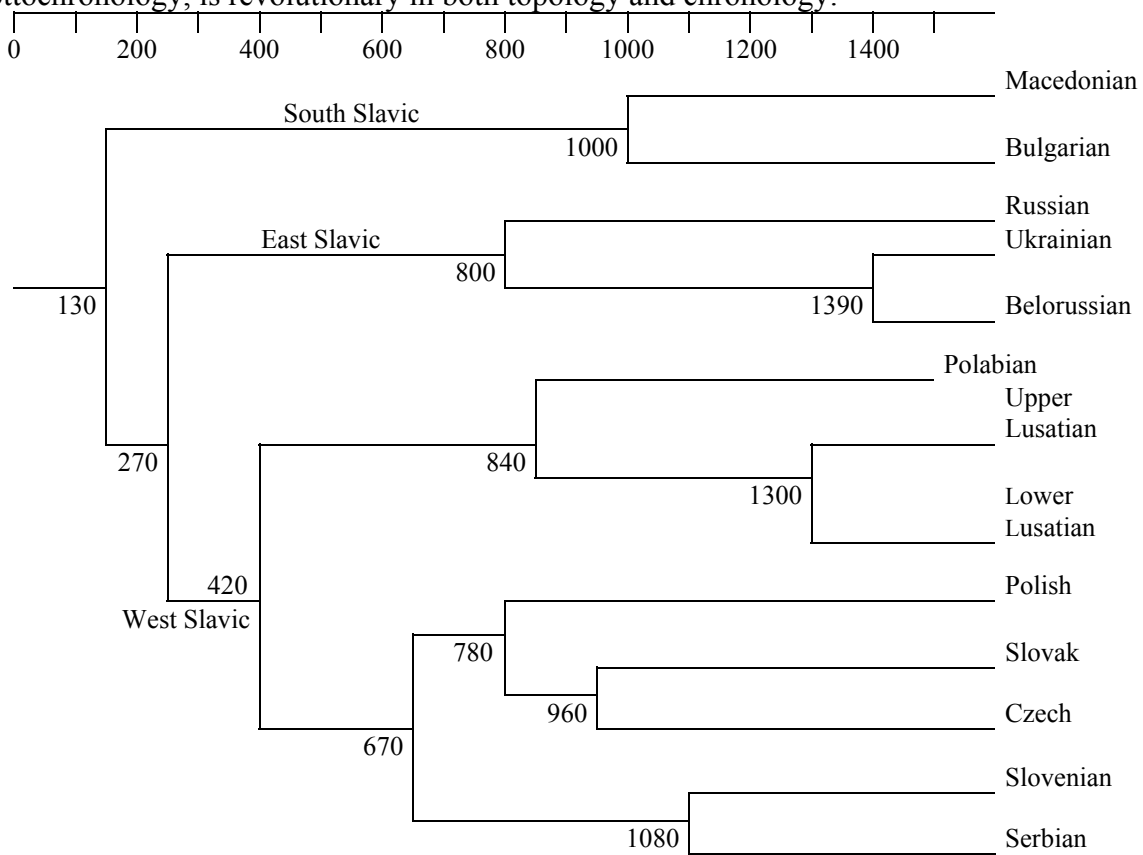
12.3. Using the principles of Starostin's recalibration of glottochronology, Novotná & Blažek (2005) proposed another model of the internal grouping of the Slavic languages:
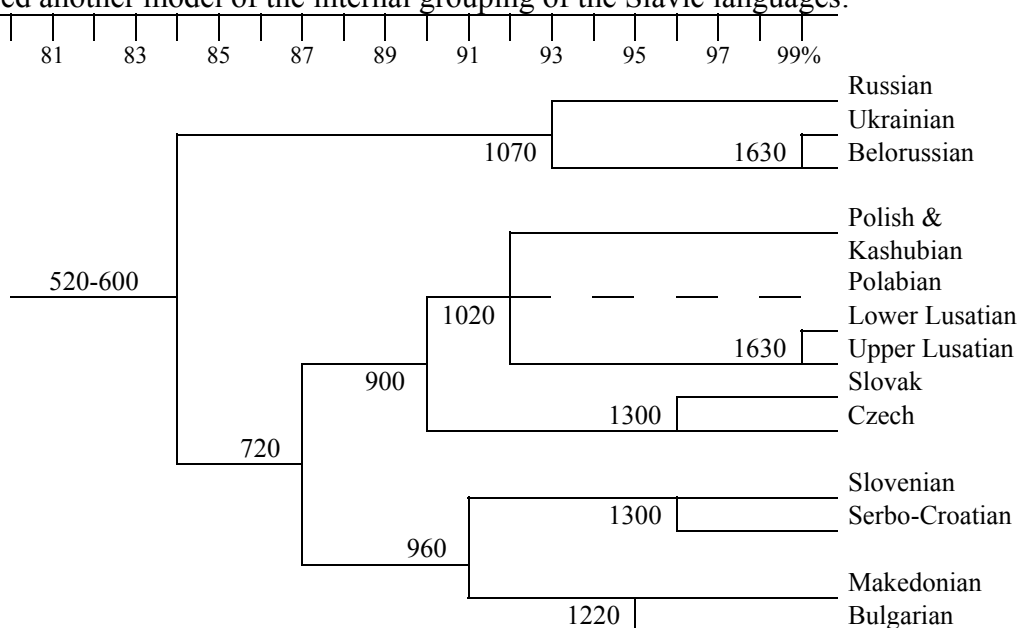
Comments.
The present choice is only illustrative, not exhaustive. The biggest controversy occurs in the case of the relic languages, where our knowledge especially of their lexicons is only very limited. The arguments for their genetic classification is based only on the accidently preserved lexical, phonological and morphological isoglosses which are evaluated qualitatively. The models of two great authorities in this field are here confronted: [0.3.] V.I. Georiev (1981) and [0.4.] E.P. Hamp (1990). It is apparent they are radically different. The quantitative approach is also represented here by two examples: [0.5] Ringe, Warnow, Taylor (2002), demonstrating the cladistic approach, and [0.6.] Starostin (2004), using his modification of the recalibrated glottochronology. Ringe, Warnow & Taylor were chosen for their ability to apply highly sophisticated mathematical methods for carefully analyzed linguistic data. In their model there is only one problematic conclusion, namely the position of Albanian together with Germanic. In the alternative cladistic models published practically in the same time (Gray & Atkinson 2003; Rexová, Frynta & Zrzavý 2003) only the mathematical approaches are accented. The results of both teams - the absolute dating of the beginning of the divergence of the Indo-European languages to the 9th mill. BP implies at least 5 millennia of the independent development before the first literary fixation of such languages as Hittite, Palaic, Luwian, Vedic, Avestan and Mycenaean Greek in the 4th mill. BP. Regarding the striking similarities between these languages in this phase of their development, especially in grammar, it is difficult to imagine their fast later development, confronting the situation in the beginning of their literary era with corresponding contemporary descendants. Starostin eliminated the most important imperfections of the classical glottochronology, introducing both different basic formula (time of divergence for two contemporary languages: $t = \sqrt{(\ln c)} / \sqrt{(-2\lambda \sqrt{c})}$, where $c = N(t) / N_0$, i.e. the share of the common inherited cognates vs. the number of all common semantic pairs from the testing basic list, if the borrowings are eliminated; $\lambda = \ln c / t^2$; cf. the 'classical formula' by Swadesh: $t = \ln c / -2\lambda$) and the constant of disintegration (0.05 per mill., instead of 0.14 by Swadesh for the 100-word-list). His conclusions are always based on a very careful etymological analysis, including the elimination of all borrowings. Finally, his dating of the beginning of disintegration of the Indo-European languages to the 7th mill. BP, i.e. 2 mill. later than the dating of the two teams mentioned above, seems much more realistic.

The situation with the internal classification of the daughter branches is not easier, but paradoxically still more controversial. Let us confront e.g. 3 quite different classifications for the Anatolian branch, 5 for the Romance languages and 12(!) for the Germanic languages, although the

models of [10.9] Antonsen, [10.11] Embleton and [10.12] Starostin in principle reflect the same topology, although Antenson worked especially with the phonological and morphological isoglosses, while both Embleton and Starostin developed everybody her/his own modification of glottochronology. In the case of the Slavic languages the situation is not more idylic, cf. the text (in Czech) "On the classification of the Slavic languages: the development of the evolutionary models" <http://www.phil.muni.cz/linguistica/art/novbla/ nob-001.pdf>. Applying his method for the Slavic languages, Starostin [12.2] reached the results which were too old and too controversial in confrontation with the results of classification based on phonological and morphological criteria. But when the present author and his co-author Petra Novotná [12.3] did the only little correction in the method of Starostin, namely the inclusion of synonyms, while N_0 was redefined as the number of the semantic units attested in both tested languages without any borrowing, the results became more realistic, including the agreement with the data of archaeology and history. During our last personal dialogue in Leiden, June 2005, Sergei asked me for the secret of our approach. He admitted that our results were "more charming" in confrontation with his ones and the solution based on the inclusion of synonyms was fruitful.

Summing up, confronting the various methods of the genetic classification and their results, the following conclusions could be formulated:

1) The conclusions expressing the relative or absolute grade of the genetic relationship between two or more languages cannot be formulated without the quantitative approach.

2) Any calculation of the linguistic phenomena serving to demonstration of the genetic links or their grade should be based on the careful application of the comparative-historical method.

3) The results based only on phonology or morphology or only on lexicon cannot be taken as definitive, although in specific cases it has been the only way to formulate any conclusion about the genetic affiliation, e.g. in the case of the relic languages known only from stereotyp laconic texts, glosses, borrowings or proper names.

4) The most convincing results correlate with the situation when the quantitative approach, based usually on the etymological analysis of compared basic lexicons, and the qualitative approach, based on the comparison in the field of historical phonology and morphology, are both in a good agreement (e.g. the Germanic languages). If the results also agree with the extra-linguistic data, e.g. from history or archaeology, etc., the probability of such the model grows.

As far as I can judge, these conclusions were systematically applied by Sergei Starostin.

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